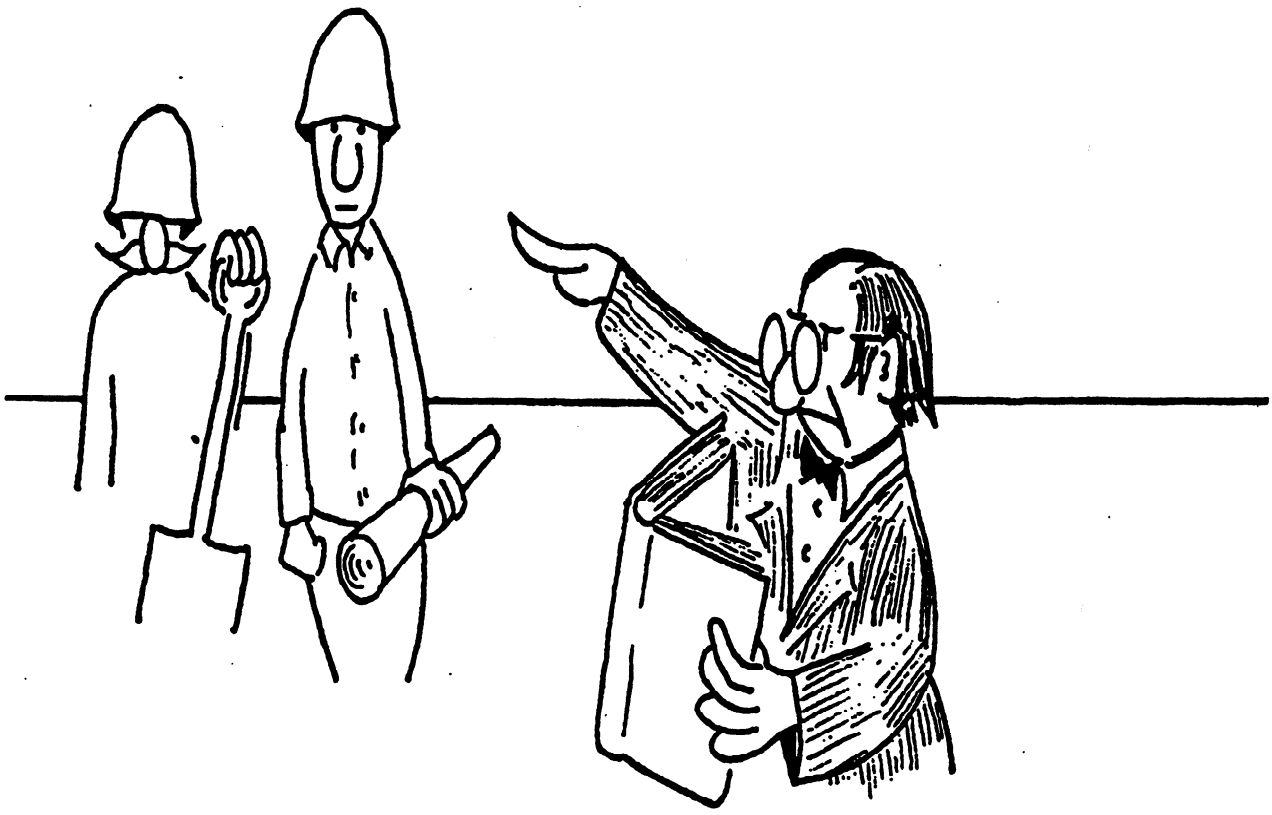
LEGAL REQUIREMENTS



LEGAL REQUIREMENTS AND RESPONSIBILITIES

The State of California provides for the planning and design of permanent work to be prepared by the State (there are some exceptions with Design work prepared by a consultant), with the construction, including design of temporary work,to be performed by the Contractor.

This section of the manual deals with the responsibilities of the Contractor and the State as related to trench and excavation work during the construction phase. Under Department of Transportation specifications, the Contractor is responsible for performing the work in accordance with the contract. This responsibility includes compliance with all State and Federal Laws, and any other applicable county or municipal ordinances and regulations which in any manner affect the work.

Sections 5, 7, 8, 15, and 19 of the Standard Specifications contain references to the protection of workmen and public in trench and excavation operations. Of particular interest is Section 5-1.02A. "Trench Excavation Safety Plans":

> - Attention is directed to Section 7-l.OlE, Trench Safety." Excavation for any bench 5 feet or more in depth shall not begin until the Contractor has received approval from the Engineer, of the Contractor's detailed plan for worker protection from the hazards of caving ground during the excavation of such trench. Such plan shall be submitted at least 3 weeks before the Contractor intends to begin excavation for the trench and shall show the details of the design of shoring, bracing, sloping or other provisions to be made for worker protection during such excavation. No such plan shall allow the use of shoring, sloping or a protective system less effective than that required by the Construction Safety Orders of the Division of Occupational Safety and Health and if such plan varies from the shoring system standards established by the Construction Safety Orders, the plan shall be prepared and signed by an Engineer who is registered as a Civil or Structural Engineer in the State of California.

A Geotechnical Engineer shallprepare soils reports and supplemental geotechnical data.

Any excavation in which there is a potential hazard of cave-in or moving ground will require a protective earth retaining plan$_t$ Section 5-1.02 of Standard Specifications provides that the Contractor furnish plans for temporary work to the Engineer. The Engineershall review and approvesuch plans before the start of any work. This same section 5-1.02 also provides for any earth retaining system for excavations which by definition, as given in the Construction Safety Orders, are not trenches.

Under Section 5-1.01 of the Standard Specifications the Engineer shall decide on questions which may arise as to acceptability of materials furnished and work performed. However, it is the Contractor's responsibility to properly evaluate the quality of. materials.

The State has the responsibility for administrating the contract. This means that interpretation of contract requirements, including acceptance of materials, is done by the State, not any other agency such as Cal/OSHA. Although the work must be performed in compliance with the Construction Safety Orders, there may be situations or conditions where they are not applicable or adequate. Under these circumstances the Engineer makes an interpretation and informs the Contractor accordingly of what is required.

The documents which apply to a contract are as follows:

- Department of Transportation Standard Specifications.
- Project Special Provisions.
- Contract and Standard Plans.
- California Occupational Safety and Health Standards. (Construction Safety Orders).
- California Labor Code (The Law).
- All existing and future laws, ordinances and regulations of other governmental bodies or agencies, such as railroads, having jurisdiction within the project.

LABOR CODE

The California Labor Code is the document of enacted law to which all employers and employees must conform.

Division 5 'Safety in Employment' was enacted by Statute 1937 with changes in l973, 1977, and 1979. Sections 6300 to 6707 pertain to the subject of trenching and shoring.

Section 6300 establishes that the California Occupational Safety and Health Act of 1973 is enacted law. This authorizes the enforcement of effective standards for safety at work sites.

Section 6307 gives the Division of Occupational Safety and Health (DOSH) the power, jurisdiction, and supervision over every place of employment to enforce and administer laws (safety orders).

Section 6407, states that, "Every employer and every employee shall comply with occupational safety and health standards, with Section 25910 of the Health and Safety Code, and with all rules, regulations and orders pursuant to this division which are applicable to his own actions and conduct (Statute 1977 Ch. 62)".

Section 6705 establishes that for public work projects involving an estimated expenditure in excess of $25,000 for the excavation of any trench or trenches, five feet or more in depth, the Contractor must submit shoring plans to the awarding body.

Section 6706 pertains to the permit requirements for trench work.

The Labor Code is available on request from:

State of California
Department of General Services
Documents and Publications Section
P. O. Box 1015
North Highlands, CA 95660

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH.

The Division of Occupational Safety and Health (DOSH) has the jurisdiction and power to enforce the legal standards for safety in every place of employment in the State. This includes work areas of governmental bodies as well as the private sector. DOSH enforces the Construction Safety Orders by means of inspections and investigations. citations are issued for violations and penalties may be

assessed. In the event of an "imminent hazard", entry to the area in violation is prohibited.

DOSH may perform the following activities:

Preparation of construction safety orders
Policing of conformance with safety orders
Investigation of accidents
Compilation of Safety Statistics
Conduct Safety Training
Publication of Safety Order Changes
Publication of Safety, Information (Training & Education Brochures)
Consultation Service
Assessment and review of citations

There are numerous geographical DOSH offices within the state. Consult Appendix A for a listing of DOSH offices.

Compliance with the Construction Safety Orders is not the same as conducting a "safety program" for employees. The objective of accident-free work is the same, but the means of implementation are quite different. The DOSH activity is essentially a policing operation in regard to ascertaining compliance with the Construction Safety Orders. An employer is required by DOSH to provide or conduct a safety program. In addition to the inspection for compliance with the Construction Safety Orders, a safety program includes education and training activities and taking positive actions in regard to conduct of the work.

DOSH will notperform engineering or inspection work for the Contractor or CalTrans.

The following paragraphs give highlights of the various portions of Title 8 of the Construction Safety Orders. Title 8 includes trench and excavation work.

The introduction to the Construction Safety Orders states that no employer shall occupy or maintain any place of employment that is not safe. This order is expanded in Section 1541 which directs that no work in or adjacent to an excavation will be performed until conditions have been examined and found to be safe by a competent person, and also that all excavation work shall have daily and other periodic inspections.

Section 1503 specifies that a permit be issued by DOSH prior to the start of any excavation work for any trench 5 feet or deeper in to which a person is required to descend. There are some exceptions, such as work performed by State forces on State R/W, and forces of utilities which are under the jurisdiction of the Public Utilities Commission. Railroads are included in the foregoing group.

It should be noted that a DOSH permit is not an approval of any shoring plan. To procure an excavation permit the Contractor makes application to DOSH. In this application the work, its location, and when it is to be done are described. DOSH may request that the Contractor furnishmore detailsforunusualwork, perhaps even a set of plans. These plans are not necessarily the detailed plans that are submitted to the Engineer for review and approval.

The objective of a DOSH Permit is to put DOSH on notice that potentially hazardous work is scheduled at a specific location. DOSH may then arrange to inspect the work.

Permits are issued by DOSH for various conditions. A single permit can cover work of a similar nature on different contracts, It can be for a specifictype of work within a DOSH regional area. In this case, the permit will have a time limit and the user is obligated to inform the appropriate DOSH office of his schedule for work covered by the permit. A copy of the permit is to be posted at the work site. It is the responsibility of the Engineer to ascertain that the Contractor has secured a proper permit before permitting any trenching or excavation work to begin.

Excavations are defined to include trenches. The Construction Safety Orders in Section 1540 of Article 6 define a trench as any excavation in which the depth generally exceeds the average width and the bottom width is not greater than 15 feet. Excavations which are more than 15 feet wide at the bottom, or shafts, tunnels, and mines are excavations by DOSH definition. However, this does not mean that an excavation permit and shoring plans are not required.' Excavations which do not fall into the trench category may require a permit because of their hazardous nature. Box culvert and bridge foundations are examples. Bridge abutments will present a trench condition at the time that back wall form panels are erected. The solution is to either provide a shoring system to retain the earth, or cut the slope back at an acceptable angle.

State Statutes

Section 137.6 of Article 3 in Chapter 1 of Division 1 of the Statutes, requires that the review and approval of Contractor's plans for temporary structures in connection with the construction of State Highways shall be done by a Registered Professional Engineer.

> "137.6. The design of, the drafting of specifications for, and the inspection and approval of state highway structures shall be by civil engineers licensed pursuant to the Professional Engineers Act (Chapter 7 (commencing with Section 6700), Division 3, Business and Professions Code)."
>
> "The approval of plans for, and the inspection and approval of, temporary structures erected by contractors in connection with the construction of state highway structures shall also be by such licensed civil engineers."

This means that the Engineer has the responsibility to see that appropriate plans are submitted and properly reviewed for work to be performed within State right of way.

FEDERAL HIGHWAY ADMINISTRATION (FWHA)

Section 6 of the Contract Special Provisions contains the Federal requirements for the project. These include provisions for safety and accident prevention. The Contractor is required to comply with all applicable Federal, state, and local laws governing safety, health, and sanitation. Conformancewith current DOSH standards will satisfy Federal Requirements, including FedOSHA.

RAILROAD RELATIONS AND REQUIREMENTS

Section 13 of the Contract Special Provisions for the project will contain the railroad agreement with the State. These provisions require that the Contractor shall cooperate with the railroad where work is over, under, or adjacent to tracks, or within railroad property, and that all rules and regulations of the railroad concerned shall be complied with. It also requires that the Contractor and subcontractors have approved Railroad Insurance and submit plans for all temporary works on railroad property to the railroad for review and approval.

The Department of Transportation has established an administrative procedure for handling shoring plans which involve railroads as follows:

- Contractor submits shoring plans to the Engineer (Project Resident Engineer). Railroads require that a plan be prepared even if proposed system is in accordance with DOSH Details. Shoring is required for excavations less than 5 foot in depth if specific-railroad criteria calls for it (railroads differ in requirements). The drawing must include a trench cross section and-a plan view giving minimum clearances relative to railroad track. Provisions for walkways if required, are to be submitted with the plans. Plans are to be prepared by a Professional Engineer with each sheet of the plans signed.

- Some railroads have their own specifications for shoring. The railroad specifications will be used in conjunction with DOT Policy and the DOSH Construction Safety Orders. The most restrictive of these will apply. The reader is referred to Appendix C of this manual for railroad requirements.

- The Resident Engineer reviews the plan: When satisfied, the Resident Engineer will forward the plan with the Contractor's and the Engineer's calculations to the Office of Structure Construction in Sacramento (OSC).

- In Sacramento, OSC will make a supplementary review. Then if the plans and calculations are satisfactory they will be forwarded to the railroad concerned.

- The railroad reviews and approves the shoring plans, and notifies OSC, Sacramento.

- OSC notifies the Resident Engineer of approval.

- The Resident Engineer approves the plans and notifies the Contractor.

Section 19-1.02, "Preservation of Property" of the Standard Specifications includes a provision stipulating that shoring plans be submitted at least 8 weeks before the Contractor intends to begin any excavation requiring shoring.

Note that the railroad deals directly with the Sacramento Office of OSC, not with the Engineer on the job site. Adequate time should be

allowed for the review procedure. The railroad may take up to 6 weeks for review from the time that they receive the plans from Sacramento. The proper time to alert the Contractor to procedure and time needed is at the pre-job conference.

Normally the OSC Engineer on the job will handle the review and approval of shoring plans which involve railroads. When there is no Project Office of Structure Construction Representative or Resident Engineer, the District may request technical assistance from the Office of Structure Construction Area Construction Engineer, or from the Office of Structure Construction in Sacramento.

SHORING PLANS

Section 5-1.02A of the Standard Specifications requires that a Contractor submit a shoring plan for any trench 5 feet or deeper to the Engineer for his review and approval. Such plans are to be submitted in a timely manner as Specified in Section 5-1.02A of the Standard Specifications (or as required by the contract Special Provisions) before the Contractor intends to begin excavating. No work will begin until the shoring plans are approved by the Engineer.

If the Contractor elects to use the Details in the Construction Safety Orders, it is not required that a Professional Engineer prepare the plan. However, a shoring plan is still required. This plan can be a letter to the Engineer containing the information outlined in, "Shoring Plan Submittal," on page 2-2 of this manual.

The Details in the Construction Safety Orders consist of sloping, or tables of minimum member sizes for timber and aluminum hydraulic shoring with member spacings related to the three general types of soil, along with various restrictions on use of materials and construction methods. The Engineer is cautioned that conditions may be such that the Details will not directly apply - for example when a surcharge load exceeds the minimum construction surcharge of 72 psf. In such a case, an 'engineered' system is required. The proposed plan must provide a system at least as effective as the DOSH Details, and the plan must be prepared and signed by a California registered professional engineer. This plan would include the following items in addition to information listed for a Standard Detail plan:

- An engineering drawing showing sizes, spacing, connections, etc. of materials.
- Appropriate additional soils data.
- Supporting data such as design calculations or material tests.

The Engineer will make a structural review of any plan which deviates from the DOSH Details.

In general practice, engineered drawings will be accompanied by the engineer's calculations. If railroads are involved, a minimum of three sets of calculations and seven sets of plans should be submitted. The railroads require a minimum of one set of calculations each from the designer and reviewer and four sets of shoring plans. One additional complete set of calculations and drawings will be needed for the OSC Sacramento Office.

TECHNICAL DATA

This manual contains a presentation of much of the technical engineering information which can be used by the Engineer in making a review of shoring plans.

The design or engineering analysis, of a shoring system is accomplished in the following sequence.

- The soil or earth that is to be retained and its engineering properties are determined.
- Soil properties are then used in geotechnical mechanics or procedures to determine the earth pressure force acting on the shoring system. An equivalent fluid, Kw, may be determined.
- The design lateral force is then distributed, in the form of a pressure diagram. The distribution, or shape, of the diagram is a function of type of shoring system and the soil interaction with the system.
- Lateral loads due to surcharges and from sources other than basic soil pressure (e.g., ground water) are determined and may be combined with the basic soil pressure diagram, Modified for practicability, the resulting lateral pressures become the design, lateral pressure diagram.
- The design lateral pressure diagram is applied to the system, and a structural analysis is made. Again, there is a range from simplified to refined or complex procedures that can be used.

Keep in mind a proper balance of engineering effort. If soils data is not detailed or is not available, it is not proper to use

complex or sophisticated distribution theories. With good soils data it is satisfactory to first use simplified analysis procedures which is conservative; then if the system appears inadequate, use a more refined procedure.

The engineering analysis is a progressive procedure dependent upon complexity or sophistication. It is a function of size of project or how unusual or unique it is. A simplified analysis procedure can be used for the majority of trench and shoring projects. For complex systems, the Engineer may be presented with theories which are not discussed in this manual. The Engineer should be prepared to do some research. Do not reject a procedure just because it is not covered in this manual. Request any design information or copies of text material needed to analyze the calculations. The Geotechnical Engineering branch of the Transportation Materials and Research Laboratory is available for consultation for major problems. This manual presents very basic engineering procedures.

It is recognized that the construction phase is of equal importance. Construction activities include workmanship, inspection, and taking appropriate timely action with regard to changing conditions. The reader is referred to Chapter 12, on Construction Considerations, for more information.

When shoring plans are being reviewed, the following procedure is recommended. Perform an initial review of the shoring in conformance with the criteria in the trenching and shoring manual. If the review indicates discrepancies in the design, it will be necessary to review the criteria used by the designer. As with any set of plans or working drawings, if the submitted material is incomplete, it will be necessary to have the Contractor obtain a more thorough description of design procedures, assumptions, additional calculations, or copies of text confirming design computations. Note, however, there is no requirement that the design must be in conformance with the criteria outlined in this manual. In case of dispute, telephone Sacramento.

Many shoring designs completed by Consulting and/or Structural Engineering firms contain complete soils data with shoring recommendations. The Consulting or Structural Engineering firms may modify or conform to the soil data recommendations. Shoring designs by such firms will most generally be less conservative than if the design were in conformance with this manual; consequently the shoring may need to be reviewed in the manner in which it was designed.